

Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

Since when x = y = 0, $p = \frac{b}{a}$, therefore $c = \frac{b + \sqrt{a^2 + b^2}}{a^{(n+1)/n}}$.

Hence, also

$$y_a = \frac{cn}{2(n+1)} a^{(n+1)/n} - \frac{n}{2c(n-1)} a^{(n-1)/n}.$$

Therefore, finally, we have

$$y = \frac{cn}{2(n+1)} \left(a^{(n+1)/n} - (a-x)^{(n+1)/n} \right) - \frac{n}{2c(n-1)} \left(a^{(n-1)/n} - (a-x)^{(n-1)/n} \right).$$

We see that the curve K_1 cuts BC at the point (a, y_a) and, since for n = 1 $y_a = \infty$, it follows that n must be greater than 1 if the hound can catch the fox.

If we assume the side of the square AB equal to 2, then we have a=1, b=0 and therefore $c=\pm 1$, where we have to take c=-1, because y' is always positive and we get

$$y = \frac{n}{2(n-1)} (1 - (1-x)^{(n-1)/n}) - \frac{n}{2(n+1)} (1 - (1-x)^{(n+1)/n}),$$

and

$$y_a = \frac{n}{2(n-1)} - \frac{n}{2(n+1)}$$
.

As long as $y_a < 2$, the hound catches the fox on the side BC of the square, and we find the smallest n from $2 = \frac{n}{2(n-1)} - \frac{n}{2(n+1)}$, that is, n = 1.3680. If n < 1.3680, then we find the point $O_1 \equiv (x_1, y_1)$ whose tangent passes through C and lay a new system of axes X_1Y_1 for the curve K_2 . Here is $a = 2 - y_1$, $b = 1 - x_1$, so that we find the equation of the curve K_2 and can find y_a in which alone we are interested. If the hound does not catch the fox on the side CD we have to repeat the process.

We find O_1 by use of the equation 2 = y + y'(a - x). By substituting the above values for y and y', we find

$$\frac{2n}{n^2-1}-4=\frac{(1-x)^{(n+1)/n}}{n+1}+\frac{(1-x)^{(n-1)/n}}{n-1}.$$

If we assume $(1-x)^{1/n} = U$, we have the form $a = bU^m + cU^{m'}$ from which we find U, and hence x and O_1 .

Also solved by Barnem Libby.

334. Proposed by ELMER SCHUYLER, Brooklyn, N. Y.

Solve

$$\frac{\partial^2 T}{\partial u \partial v} + \frac{2v}{u^2 + v^2 + 1} \frac{\partial T}{\partial u} + \frac{2u}{u^2 + v^2 + 1} \frac{\partial T}{\partial v} = 0.$$

SOLUTION BY R. D. CARMICHAEL, Indiana University.

The equation may be written in the form

$$\frac{\partial}{\partial v} \left(\frac{\partial T}{\partial u} + \frac{2u}{u^2 + v^2 + 1} T \right) + \frac{2v}{u^2 + v^2 + 1} \left(\frac{\partial T}{\partial v} + \frac{2u}{u^2 + v^2 + 1} T \right) = 0.$$

This equation may be viewed as an ordinary differential equation for determining the quantity in parenthesis; the arbitrary "constant" is then a function of u. Solving this equation, we have

$$\frac{\partial T}{\partial u} + \frac{2u}{u^2 + v^2 + 1} T = \frac{\bar{\psi}(u)}{u^2 + v^2 + 1};$$

or

$$(u^2 + v^2 + 1) \frac{\partial T}{\partial u} + 2uT = \overline{\psi}(u).$$

Hence

$$(u^2 + v^2 + 1) T = \int \overline{\psi}(u) du + \varphi(v) = \psi(u) + \varphi(v).$$

Therefore, we have

$$T = \frac{\psi(u) + \varphi(v)}{u^2 + v^2 + 1},$$

where $\psi(u)$ and $\varphi(v)$ are arbitrary functions of u and v respectively.

Solved in a different manner by the Proposer.

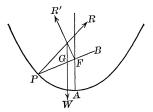
MECHANICS.

267. Proposed by G. H. LIGHT, Purdue University.

A parabolic curve is placed in a vertical plane with its axis vertical and vertex downwards, and inside it, and against a peg in the focus, and against the concave arc, a smooth uniform and heavy beam rests; required the position of equilibrium. [From Bowser's Mechanics, Ex. 37, p. 96.]

SOLUTION BY CHRISTIAN HORNUNG, Heidelberg University, Tiffin, O.

Let PB be the beam of length l, of weight W, resting on the peg at the focus, F; let AF = p, $AFP = \theta$, and GP = l/2. From the polar equation of the parabola we have $FP = 2p/(1 + \cos \theta)$.



Since all the surfaces are smooth the resistances, R and R', at P and F respectively, are normal and therefore the angle $BPR = \theta/2$.

Using the equations $\Sigma x = 0$, $\Sigma y = 0$ and Σ (moments about F) = 0, which